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Conference Abstract

Unpacking Data Quality in Citizen Science: An Analysis of City Nature Challenge India

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Abstract

The City Nature Challenge (CNC) has rapidly expanded across India from 2023 to 2025, leading to a surge in biodiversity observations on iNaturalist. While the volume of data is impressive, its long-term research and conservation value depends heavily on data quality (Vattakaven et al. 2022)—particularly the proportion of observations reaching "Research Grade" (RG). This study investigates patterns and barriers related to RG achievement in CNC India observations over three consecutive years using iNaturalist data (iNaturalist Community 2023, iNaturalist Community 2024, iNaturalist Community 2025).

We analyze RG percentages at regional, state, and city scales, comparing the total number of observations year by year (Fig. 1). By tracking these metrics from 2023 to 2025, we quantify the "identification lag" (Fig. 2)—the gap between data quantity (uploads) and data quality (verified records). Our analysis identifies whether growth is driven solely by participation or if it is supported by a parallel increase in expert identification (Fig. 3). In addition to temporal (year-wise) comparisons, we also investigate spatial (geographical) variations in data quality across India.

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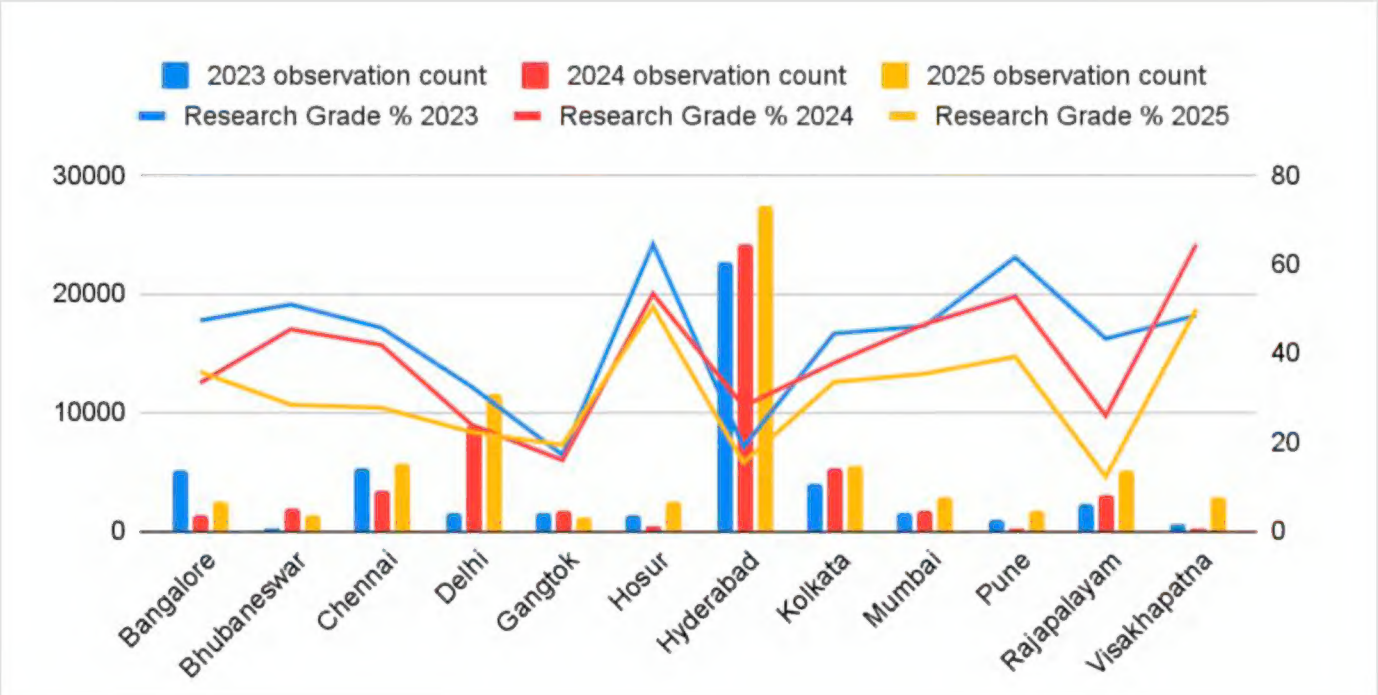

Figure 1.

City Nature Challenge India Spatial & Temporal Analysis: Observation Count and Research Grade Percentage from 12 cities over three years (Vaishnav, Barve, Bhat, A and Shanker CC-BY 4.0).

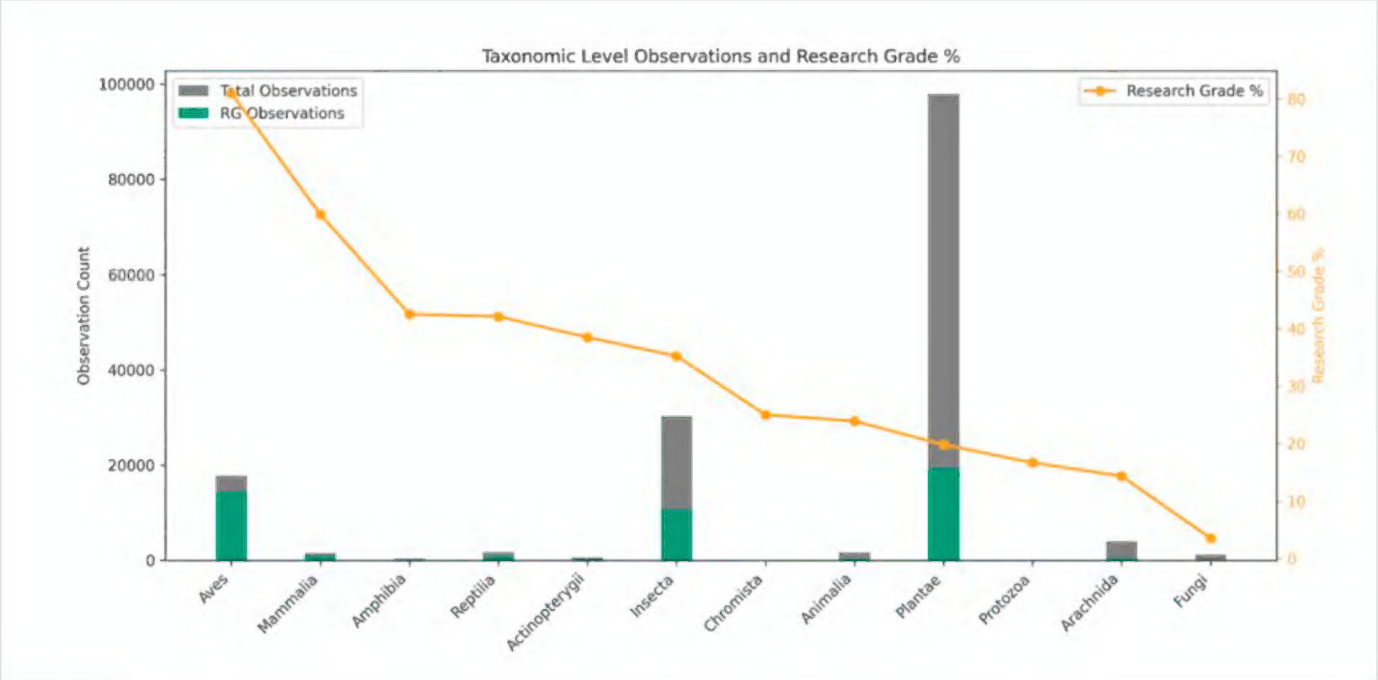

Figure 2.

City Nature Challenge India Taxonomic Analysis: Observation Count and Research Grade Percentage for different taxa (Vaishnav, Barve, Bhat, A and Shanker CC-BY 4.0).

We also identify taxa and locations with disproportionately high numbers of "Needs ID" observations (which are not yet considered as RG; Fig. 4). This analysis is conducted both horizontally—i.e., comparing taxonomic groups (such as, Plantae, Fungi, Animalia, Insecta), and vertically—i.e., comparing taxonomic rank (such as, family, genus, species). This approach helps us to evaluate whether these bottlenecks stem from inherent identification challenges, observer behavior, or a lack of specialized taxonomic expertise within the local identifier community.

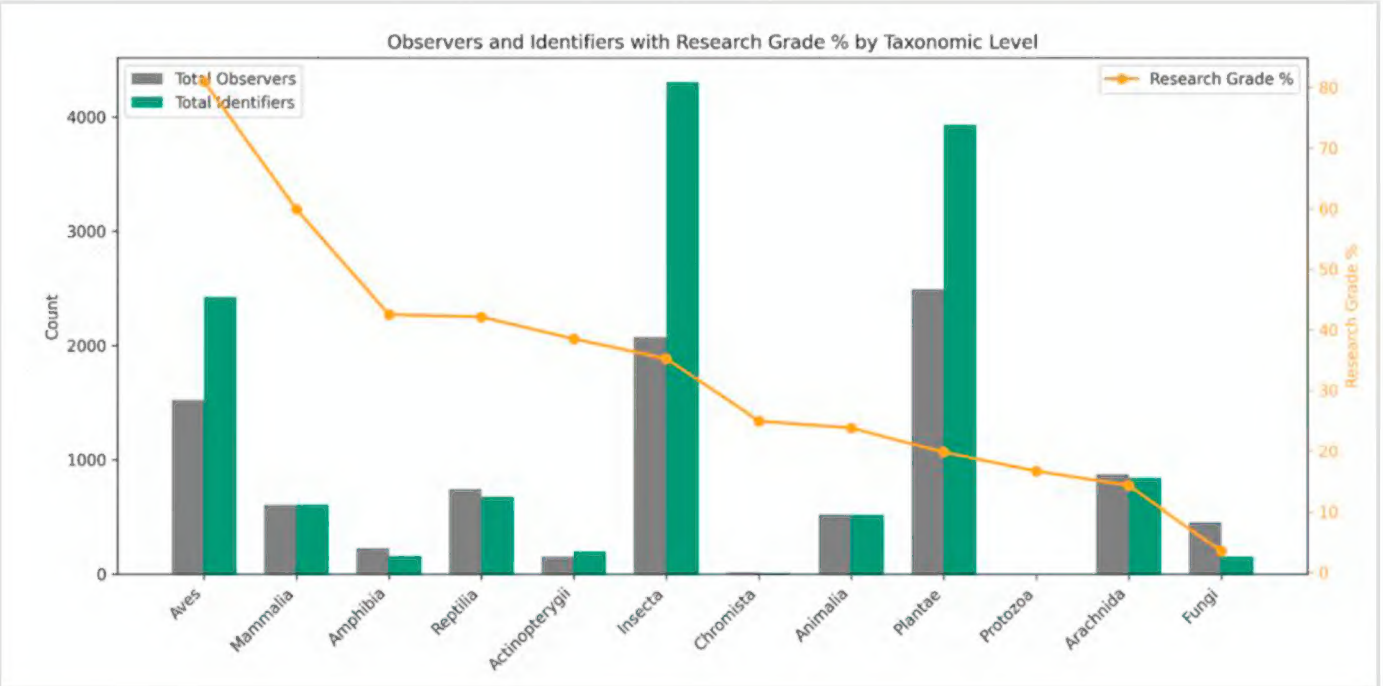

Figure 3.

City Nature Challenge India Taxonomic Analysis: Observers and Identifiers Count for different taxa, along with Research Grade Percentage (Vaishnav, Barve, Bhat, A and Shanker CC-BY 4.0).

Rank	Actinopterygii	Amphibia	Animalia	Arachnida	Aves	Chromista	Fungi	Insecta	Mammalia	Mollusca	Plantae	Protozoa	Reptilia	NA	Grand Total	% of total observations
Life	0	0	0	0	0	0	0	0	0	0	0	0	0	11401	11401	9.34
Kingdom	0	0	185	0	0	0	313	0	0	0	12506	0	0	6	13012	10.66
Phylum	0	0	317	0	0	0	19	0	0	9	2681	0	0	1	3027	2.48
Class	83	8	60	16	1012	2	167	999	25	202	9567	0	1	0	12172	9.97
Order	24	70	124	502	119	0	90	3485	67	63	432	0	207	0	5183	4.24
Family	64	30	139	958	269	0	82	4912	109	151	6163	0	82	0	12959	10.62
Genus	83	48	202	1295	778	9	208	5620	145	236	15978	1	366	4	24475	20.06
Species	120	86	235	892	1700	4	274	4623	261	226	31179	4	346	11	39761	32.59
Grand Total	374	242	1292	3461	3378	15	1153	19639	607	887	78508	5	1002	11423	121988	100

Figure 4.

City Nature Challenge India Taxonomic Analysis for 'Needs ID' Observations: Number of observations stuck at different ranks for different taxa (Vaishnav, Barve, Bhat, A and Shanker CC-BY 4.0).

Our results indicate a widening gap between upload volume and RG attainment (Fig. 2), particularly in high-performing regions. This disparity is most acute for taxa requiring specialized expertise and for observations at the species level. These findings offer practical insights for enhancing community engagement, directing expert identification efforts, and designing support mechanisms for new observers.

By providing a nuanced perspective on the evolution of data quality within a massive, volunteer-driven dataset, this presentation contributes to broader discussions on

sustaining and improving the living data ecosystems that support contemporary biodiversity science.

Keywords

iNaturalist, Research Grade

Presenting author

Ram Dayal Vaishnav

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Living Data 2025

Conflicts of interest

The authors have declared that no competing interests exist.

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